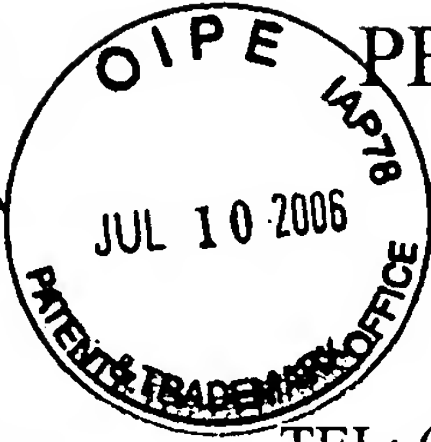


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June 30, 2006

Attn: The Certificate of Correction Branch  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Re: U.S. Patent No. 7,042,199  
Issued: May 9, 2006  
Title: SERIES CONNECTED BUCK-BOOST REGULATOR  
Inventors: Arthur G. Birchenough  
Our Docket: 35279

**Certificate**  
JUL 12 2006  
**of Correction**

Sir:

A Certificate of Correction under 35 U.S.C. 254 is hereby requested to correct Patent Office printing errors in the above-identified patent. Enclosed herewith is a proposed Certificate of Correction (Form No. PTO-1050) and documentation in support of the proposed corrections for consideration.

It is requested that the Certificate of Correction be completed and mailed at an early date to the undersigned attorney of record.

Respectfully submitted,

By John P. Murtaugh  
John P. Murtaugh, Reg. No. 34226

JPM/nra

Enclosures:

- Form PTO/SB/44
- Documentation in support

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date indicated below.

John P. Murtaugh

Name of Attorney for Applicant(s)

July 5, 2006  
Date

John P. Murtaugh  
Signature of Attorney

JUL 12 2006

**UNITED STATES PATENT AND TRADEMARK OFFICE  
CERTIFICATE OF CORRECTION**

PATENT NO. : 7,042,199  
DATED : May 9, 2006  
INVENTOR(S) : Arthur G. Birchenough

PAGE 1 OF 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the claims, claim 10, line 9, please delete ":" (colon) and insert therefor - - ; - - (semicolon).

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PATENT NO. 7,042,199

No. of additional copies

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JUN 9 2006



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No. : 10/629,875  
Applicant : Arthur G. Birchenough  
Filed : July 28, 2003  
Title : SERIES CONNECTED BUCK-BOOST REGULATOR  
TC/A.U. : 2838  
Examiner : Matthew Van Nguyen  
Confirmation No. : 5577  
Docket No. : NLR 35279  
Customer No. : 00116

AMENDMENT

Mail Stop Amendment  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

This Amendment is in response to the Office action mailed June 27, 2005 having a three-month response date of September 27, 2005. Please amend the above-identified application as follows.

**Amendments to the Claims** are reflected in the listing of claims which begins on page 2 of this paper.

**Amendments to the Drawings** begin on page 7 of this paper and include one replacement sheet.

**Remarks** begin on page 8 of this paper.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date indicated below.

John P. Murtaugh

Name of Attorney for Applicant(s)

Sept 12, 2005 John P. Murtaugh

Date

Signature of Attorney

JUL 12 2006

## AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

### Listing of Claims:

1. (cancelled)

2. (currently amended) ~~The regulator of claim 1 further comprising~~ A series connected buck-boost regulator comprising:

a control circuit;

a switching circuit for connecting to a source voltage;

an output circuit connected to said switching circuit and for outputting a load voltage,

wherein

said control circuit controls said output circuit and said input circuit for operating said regulator in a plurality of modes including:

a current limiting (CL) mode;

a buck mode; and

a boost mode,

wherein only a fraction of an output power of said regulator is switched by said switching circuit during one or both of the buck and the boost modes;

and

a transformer having a primary winding and a center-tapped secondary winding, wherein the center tap of said secondary winding is for connecting to the source voltage, and wherein said primary winding is connected to said switching circuit, and further wherein said secondary winding is connected to said output circuit.

3. (currently amended) ~~The regulator of claim 1,~~ A series connected buck-boost regulator comprising:

a control circuit;

a switching circuit for connecting to a source voltage;

an output circuit connected to said switching circuit and for outputting a load voltage,

wherein

said control circuit controls said output circuit and said input circuit for operating said regulator in a plurality of modes including:

a current limiting (CL) mode;

a buck mode; and

a boost mode,

wherein only a fraction of an output power of said regulator is switched by  
said switching circuit during one or both of the buck and the boost  
modes;

and wherein said switching circuit includes a first switch, a second switch, a third switch, and a fourth switch in a bridge configuration, and further wherein said output circuit includes a series connected fifth and sixth switch connected to a series connected seventh and eighth switch.

4. (original) The regulator of claim 3, wherein, during said boost mode, said control circuit continuously turns on said fifth switch and said sixth switch, and further wherein said control circuit cycles through a plurality of boost states including:

a first boost state wherein the first, fourth, and seventh switches are on and further wherein the second, third, and eighth switches are off;

a second boost state wherein the seventh and eighth switches are on, and further wherein the first, second, third, and fourth switches are off; and

a third boost state wherein the second, third and eighth switches are on and further wherein the first, fourth, and seventh switches are off.

5. (original) The regulator of claim 3, wherein, during said buck mode, said control circuit continuously turns on said seventh switch and said eighth switch, and further wherein said control circuit cycles through a plurality of buck states including:

a first buck state wherein said first, fourth, and sixth switches are on and further wherein said second, third, and fifth switches are off;

a second buck state wherein said fifth and sixth switches are on, and further wherein said first, second, third, and fourth switches are off; and

a third buck state wherein said second, third, and fifth switches are on, and further wherein said first, fourth, and sixth switches are off.

6. (original) The regulator of claim 3, wherein, during said current limiting mode, said control circuit continuously turns off said first, second, third, and fourth switches, and further wherein said control circuit cycles through a plurality of CL states including:

a first CL state wherein said fifth, sixth, seventh, and eighth switches are on; and

a second CL state wherein said fifth, sixth, seventh, and eighth switches are off.

7. (original) The regulator of claim 3, further comprising a ninth switch connected to said secondary winding which is turned off by said control circuit during said boost and said

buck modes, but is turned on during said CURRENT LIMITING mode to short out said secondary winding.

8. (original) The regulator of claim 3, wherein each switch has a diode placed in parallel.

9. (original) The regulator of claim 8, further comprising:

a ninth switch connected to said center tap of said secondary winding which is turned off by said control circuit during said boost and said buck modes, but is turned on during said CURRENT LIMITING mode to short out said secondary winding;

a freewheeling diode connected between said output circuit and a ground;

a first transformer diode connecting a terminal of said secondary to said ninth switch;

a second transformer diode connecting another terminal of said secondary to said ninth switch; and

an inductor for connecting said output circuit to a load.

10. (original) The regulator of claim 9, wherein, during said boost mode, said control circuit continuously turns on said fifth switch and said sixth switch, and continuously turns off said ninth switch, and further wherein said control circuit cycles through a plurality of boost states including:

a first boost state wherein the first, fourth, and seventh switches are on and further wherein the second, third, and eighth switches are off;

a second boost state wherein the seventh and eighth switches are on, and further wherein the first, second, third, and fourth switches are off; and

a third boost state wherein the second, third and eighth switches are on and further wherein the first, fourth, and seventh switches are off;

and wherein, during said buck mode, said control circuit continuously turns on said seventh switch and said eighth switch, and continuously turns off said ninth switch, and further wherein said control circuit cycles through a plurality of buck states including:

a first buck state wherein said first, fourth, and sixth switches are on and further wherein said second, third, and fifth switches are off;

a second buck state wherein said fifth and sixth switches are on, and further wherein said first, second, third, and fourth switches are off; and

a third buck state wherein said second, third, and fifth switches are on, and further wherein said first, fourth, and sixth switches are off;

and further wherein, during said CURRENT LIMITING mode, said control circuit continuously turns off said first, second, third, and fourth switches, and continuously turns on said ninth switch, and further wherein said control circuit cycles through a plurality of CL states including:  
a first CL state wherein said fifth, sixth, seventh, and eighth switches are on;  
and  
a second CL state wherein said fifth, sixth, seventh, and eighth switches are off.

11. (currently amended) ~~The regulator of claim 1, further comprising~~ A series connected buck-boost regulator comprising:

a control circuit;

a switching circuit for connecting to a source voltage;

an output circuit connected to said switching circuit and for outputting a load voltage,

wherein

said control circuit controls said output circuit and said input circuit for operating said

regulator in a plurality of modes including:

a current limiting (CL) mode;

a buck mode; and

a boost mode,

wherein only a fraction of an output power of said regulator is switched by

said switching circuit during one or both of the buck and the boost

modes;

and

a transformer having a primary winding and a center-tapped secondary winding, with the center tap for connecting to the source voltage,

wherein

said switching circuit includes a first switch, a second switch, a third switch, and a

fourth switch in a bridge configuration, said primary winding of said

transformer connected to a center of said bridge, and further wherein

said output circuit includes a series connected fifth and sixth switch connected to a

terminal of said secondary winding and connected to a series connected

seventh and eighth switch connected to another terminal of said secondary

winding, and also wherein

a ninth switch is included in said regulator for shorting out said transformer secondary winding on command from said control circuit.

12. (original) The regulator of claim 11, wherein, during said boost mode, said control circuit continuously turns on said fifth switch and said sixth switch, and continuously turns off said ninth switch, and further wherein said control circuit cycles through a plurality of boost states including:

- a first boost state wherein the first, fourth, and seventh switches are on and further wherein the second, third, and eighth switches are off;
- a second boost state wherein the seventh and eighth switches are on, and further wherein the first, second, third, and fourth switches are off; and
- a third boost state wherein the second, third and eighth switches are on and further wherein the first, fourth, and seventh switches are off;

and wherein, during said buck mode, said control circuit continuously turns on said seventh switch and said eighth switch, and continuously turns off said ninth switch, and further wherein said control circuit cycles through a plurality of buck states including:

- a first buck state wherein said first, fourth, and sixth switches are on and further wherein said second, third, and fifth switches are off;
- a second buck state wherein said fifth and sixth switches are on, and further wherein said first, second, third, and fourth switches are off; and
- a third buck state wherein said second, third, and fifth switches are on, and further wherein said first, fourth, and sixth switches are off;

and further wherein, during said CURRENT LIMITING mode, said control circuit continuously turns off said first, second, third, and fourth switches, and continuously turns on said ninth switch, and further wherein said control circuit cycles through a plurality of CL states including:

- a first CL state wherein said fifth, sixth, seventh, and eighth switches are on; and
- a second CL state wherein said fifth, sixth, seventh, and eighth switches are off.

13-20. (cancelled)



### **AMENDMENTS TO THE DRAWINGS**

The attached drawing sheet, which includes Figs. 7 and 8, replaces the originally filed drawing sheet including the same. Fig. 8 has been amended to include reference numeral "30".

Attachment: One Replacement Sheet including Figs. 7 and 8

## REMARKS

Applicant's counsel thanks the Examiner for the careful consideration given the present application.

### Amendments to the Claims

The Examiner rejected claim 1 as being anticipated by Grosch (U.S. Pat. No. 4,578,630). Claim 1 has now been cancelled.

Claims 2-12 had been objected to as being dependent upon a rejected base claim but would be allowable if rewritten in independent form including all the limitations of the base claim and any intervening claims. Claims 2, 3, and 11 have been rewritten in independent form and now include all the limitations of rejected base claim 1. Original dependent claims 4-10 and 12 now depend from allowable base claims. Accordingly, claims 2-12 should now be allowed. The remaining claims have been cancelled.

No new matter has been introduced by way of this amendment.

### Amendments to the Drawings

Fig. 8 has been amended per the Examiner's request to include reference number "30" to indicate the entire control circuit as described in subparagraph 0035 of the specification.

In view of the above amendments and remarks it is believed that the application is now in condition for allowance, which is respectfully requested.

If any additional fees are required by this communication, please charge such fees to our Deposit Account No. 16-0820, Order No. 35279.

Respectfully Submitted,  
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JUL 12 2006